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TITLE: METHOD OF STERILIZATION FOR CONTAINER, APPARATUS
USING THEREFOR, AND HEAT TREATMENT FOR CONTAINER

AMENDED SPECIFICATION PROGRAMS

Please replace paragraph [0011] with the following amended paragraph:

[0011] At the step of preheating the container, in addition to heating of the whole container, a ~~lip portion~~ neck portion (1a) of the container may be heated separately. Alternatively on the step of preheating the container, while whole container is heated by a hot blast which is supplied in the container, the ~~lip portion~~ neck portion (1a) of the container may be heated separately. Since it is ~~hard to go up~~ difficult to increase the temperature of the ~~lip portion~~ neck portion as compared with other portions, ~~By heating this~~ by heating the neck portion separately, the effect of the preheating is performed more effectively. It is desirable that the hot blast is supplied from the nozzle inserted in the container. For example by the method of spraying hot blast from the outside of the ~~lip portions~~ neck portions, heating of the lip ~~portions~~ neck portions can be performed.

Please replace paragraph [0020] with the following amended paragraph:

[0020] Furthermore, the heat treatment of the container of this invention is characterized by while heating the whole container by hot blast which is supplied from the nozzle inserted in the container (1), ~~heating the lip portion~~ neck portion (1a) of the container is heated separately.

Please replace paragraph [0021] with the following amended paragraph:

[0021] By this treatment, the hot blast is surely supplied in the container by the nozzle inserted in the container. Moreover by heating the ~~lip portion~~ neck portion separately, which is more difficult to increase the temperature ~~is hard to go up of~~, the whole container can be surely and quickly heated to desired temperature. Therefore, if this heat treatment is applied at the step of preheating in the sterilization method of this invention, it can contribute to improvement in the speed of the sterilization processing. In addition, the heat treatment for the container of this invention can be used not only the preheating of the sterilization processing of the container, but all cases in which the heating of the container is needed.

Please replace paragraph [0027] with the following amended paragraph:

[0027] FIG. 1 shows a schema of the step of sterilization for a beverage bottle of an embodiment of the present invention. By this sterilization method, as first shown in FIG. 1 (a), a nozzle 2 is inserted in the interior from a ~~lip portion~~ neck portion 1a of a bottle 1, hot blast is supplied in from the nozzle 2, and the bottle 1 is preheated. Simultaneously, nozzles 3 and 3 are set in the periphery of the ~~lip portion~~ neck portion 1a of the bottle 1, hot blast is sprayed on the ~~lip portion~~ neck portion 1a from those nozzles 3, and the ~~lip portion~~ neck portion 1a is heated further. ~~Because, because~~ there is a possibility that the ~~lip portion~~ neck portion 1a may not fully be heated only by the hot blast from a nozzle 2. When the ~~lip portion~~ neck portion 1a can fully be heated only by the hot blast from a nozzle 2, it is possible to omit the nozzles 3. To insert the nozzle 2 in the bottle 1 is for surely supplying the hot blast in the bottle 1. Although the amount of insertions of a nozzle 2 may be suitably changed according to the flow rate of hot blast, the aperture of the ~~lip portion~~ neck portion 1a, etc., as shown in FIG. 2, it is good that

the top of the nozzle 2 is set at a transition region 1b of a diameter of the bottle which is set between the ~~lip-portion~~ neck portion 1a of the bottle and a body of the bottle. The transition region 1b can be defined as the range in which the bottle diameter expands from the lower end of the ~~lip-portion~~ neck portion 1a of the bottle to 70% of the largest diameter for example. It is desirable that the preheating is carried out so that the inner surface of the bottle 1 may become over 40°C.

Please replace paragraph [0036] with the following amended paragraph:

[0036] ~~an installation~~ An installation port 11 and an exhaust port 12 of the bottle 1 are prepared in the asepsis chamber 10. The bottle formed by the bottle forming machine which is not shown is conveyed along a conveyance line 13, is taken in the chamber 10 from the installation port 11, and in addition, is supplied in a machine 15 of sterilization for external surface through a turntable 14. The machine 15 of sterilization for external surface contacts the disinfectant mist (hydrogen peroxide) in external surface of the bottle 1 conveyed by the turntable 15a, and sterilizes external surface of the bottle 1. A preheating zone 15b is prepared in the part in turning route of turntable 15a. In the zone 15b, the nozzle 2 of FIG. 1(a) is inserted in the interior of the bottle 1, the nozzle 2 moves with the bottle 1, while it synchronizes with bottle of 1, and the bottle 1 is preheated. In the zone 15b, the nozzle 3 for heating the ~~lip-portion~~ neck portion 1a, if it is necessary, is also formed.

Please replace paragraph [0041] with the following amended paragraph:

[0041] The bottle 1 rinsed by the rinsing machine 19 is continuously conveyed to a turntable 21a of a filling machine 21 through a group of turntables 20. The drink is filled up in the inside of the bottle 1, while the bottle 1 is conveyed along this turntable 21a. The bottle 1 that the drink was

filled up is conveyed to a lid putting machine 22. The lid putting machine 22 thrusts a cap, which is not shown ~~into the lip~~, onto the neck portion 1a of the bottle 1, and seals the bottle 1. In addition, in the lid putting machine 22, the cap which is sterilized by a cap sterilization machine 24 is supplied from the cap-feeder 23 which is set in the exterior of the asepsis chamber 10. The bottle 1 sealed by the lid putting machine 22 is carried out by conveyance line 25 from the exhaust port 12 to the outside of asepsis chamber 10.

Please replace paragraph [0042] with the following amended paragraph:

[0042] Moreover this invention can be carried out in various forms without limiting to the above preferred embodiments. It may perform the independent devices it by discharging of the mist from the bottle 1 and heating of the bottle 1 each. For example, the bottle 1 may be heated by radiant heat from heat source set the outside of it, etc., while the mist is discharged, by drawing the air from the inside of the bottle 1. A exhaust nozzle of hot blast is prepared in the position which faces a ~~lip portion~~ neck portion inner surface of nozzle 2, and drum section 1c, etc., may be able to differently heat the ~~lip portion~~ neck portion 1a. This invention can be used for the sterilization of various containers without limiting to the beverage bottle 1. The preheating may be omitted. After stopping the supplying the disinfectant mist, supplying the hot blast may be started immediately. After discharging the mist by supplying the hot blast, rinsing may be started immediately.

Please replace paragraph [0045] with the following amended paragraph:

[0045] FIG. 5 is an explanatory view showing in the case of the preliminary sterilization. To begin with, a preform 100 shown in FIG. 5(a) is molded using an injection molding machine. In case of the PET bottle, the preform 100 is molded of polyethylene terephthalate resin (hereafter it is called PET resin). The preform 100 may be molded of not only PET resin but nylon and other thermoplastic resin. 35% hydrogen peroxide water solution diluted by volatile solvents such as the ethanol is dropped into the preform 100, shown in FIG. 5(b). The preform 100 dropped H₂O₂ solution is put into the container 300, and the container 300 is sealed with a lid 400, shown in FIG. 5(c). The container 300 which is put into the preform 100 is carried to the place for blow molding. H₂O₂ solution diluted by the volatile solvent which concentration of hydrogen peroxide H₂O₂ is the range of 0.1%-10% is used, about 0.5-5% at the H₂O₂ concentration is desirable, when it was diluted by

the ethanol. An amount of the H_2O_2 solution which is dropped into the preform 100 is different by the dilution solvent, and it is dropped within 0.1-100 μ . When it was diluted by the ethanol, 1 ~ 30 μ is desirable. The preform 100 which is dropped the H_2O_2 solution is stored into the container 300 with sealed, shown in FIG. 5(c), after that, The container 300 which is put into the preform 100 is carried to the place for blow molding, and the preform 100 is molded to a bottle by the blow molding machine. Further then, it is sterilized by the method of this invention mentioned above. The H_2O_2 solution dropped in the preform 100 evaporated in the container curing carrying and storing, the H_2O_2 steam 110a sterilizes the surface of the preform. That is to say, H_2O_2 solution 110 dropped in the preform 100, since the dilution solvent is a volatile solvent, it rapidly evaporates in the preform 100, and it diffuses in the preform 100. At the same time, H_2O_2 also evaporates with the dilution solvent, it becomes H_2O_2 steam 110a, the H_2O_2 steam 110a contacts the inner surface of preform 100, and the inner surface of preform 100 is sterilized. Since the dilution solvent of H_2O_2 is a volatile solvent, the evaporation rate of H_2O_2 is promoted, it becomes H_2O_2 steam 110a in the short time, the density of H_2O_2 steam 110a in the preform heightens, and the sterilization effect of inner surface of the preform 100 heightens. And, the H_2O_2 steam 110a evaporated in the preform 1 goes on the out side of the preform 1, because a ~~lip portion~~ neck portion of the preform 1 is opened. But the 202 steam 110a fills up into the container, and sterilized the outside of the preform 1, because the container 300 is sealed with a lid 400.

Please replace paragraph [0061] with the following amended paragraph:

[0061] In order to see the effect of heating of the ~~lip portion~~ neck portion of the bottle in the step of preheating, at the condition 3, the ~~lip portion~~ neck portion was not heated from the outside, but the ~~lip portion~~ neck portion of a

bottle was heated from the exterior at condition 5. If the ~~lip portion~~ neck portion is independently heated so that clearly from these comparisons, the sterilization effect will go up.

Please replace paragraph [0063] with the following amended paragraph:

[0063] Moreover, since according to the heating treatment for the container of this invention the ~~lip portion~~ neck portion ~~which temperature seldom goes up~~ is heated independently and the whole container can be heated certainly and quickly to desired temperature, it can contribute to improvement in the speed of the sterilization process by using it at the step of preheating in the sterilization method of this invention.